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ABSTRACT

A large body of research literature has indicated that parents exert a strong influence on their children's development of achievement attitudes. It is suggested that children's beliefs about achievement appear to be related to parents' expectations about their childrens' achievement but not to parent's attitudes regarding their own abilities and experiences. This study explores the possibility of different modeling effects in children whose parents have some college or less versus children whose parents have a college degree or more. Results indicate that significant effects emerged in only one subgroup--higher-educated mothers and their daughters.

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THE IMPACT OF MOTHERS' MATH EXPERIENCES ON THEIR DAUGHTERS' ATTITUDES TOWARD MATH

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A large research literature has shown that parents exert a strong influence on their children's development of achievement attitudes. Our own research on math achievement (Parsons, Adler & Kaczala, 1982), as well as other research in the achievement domain (Seginer, 1983), shows that parents function primarily as expectancy socializers rather than as role models. In other words, children's beliefs about achievement appear to be related to parents' expectations about their children's achievement but not to parents' attitudes regarding their own abilities and experiences. Although, in our own work, these findings were unequivocal, they reflected average relationships on the full sample of mothers and fathers. However, parent-child dynamics are not uniform across subgroups in the population at large.

The present research explores the possiblility that modeling effects might emerge in particular subgroups. Specifically, we assess modeling effects in children whose parents have some college attendance or less vs. children whose parents have a college degree or more. We believed that academic achievement, and, in particular math achievement, might be more salient among the highly educated parents compared to the less educated parents. This would result in a significant positive relationship between the achievement attitudes of the highly educated parents and their children.

METHODS

This research was conducted as part of a larger study of math achievement in school age children. Data were collected from students in 5th through 12th grade and from their mothers (N=563) and fathers (N=527) who resided in a large, middle/working-class suburb of Detroit.

A questionnaire was used to assess parents' and students' attitudes. Scales were constructed which measured students' self-perceptions of ability and effort/difficulty in math as well as current and future expectations in math classes. We also asked students about the value of math and whether they planned to take more math in the future. This resulted in six measures of student attitudes to math. In addition, in order to assess the accuracy of children's perceptions of their parents' attitudes, we asked them to rate their parents' liking of math. Items assessing parents' own attitudes toward math included self-perception of their present ability, enjoyment and difficulty in math (present attitudes) and the recollection of their ability, difficulty and effort in high school math (past attitudes). Finally, we asked parents about their perceptions of their child's ability, difficulty and effort in math.

RESULTS AND DISCUSSION

To assess the presence of modeling effects, we correlated[1] parents' own attitudes toward their past and present math achievement with their children's attitudes toward math, separately within the two parent education levels and within sex of parent and sex of child, yielding eight comparison subgroups. We conducted our analysis within these additional subgroups because it had been found that parents have different assessments of the achievement of daughters and sons (Holloway & Hess, 1982; Jayaratne, 1983; Parsons, et al., 1982), and we felt this might reflect different relationship dynamics for same- vs. other-sex parent-child pairs. Furthermore, children may be more likely to model the attitudes of their same-sex parent, rather than those of their opposite-sex parent, since their identity might be stronger in same-sex parent relationships.

We expected to find a positive relationship[2] between parents' own attitudes toward math and their children's attitudes to math only among better educated parents since we believed that math achievement might be a more salient issue in these families. Table 1 shows, however, that significant effects ($p<.01$ and correlation $>.3$[3]), all in the expected direction, emerged in only one subgroup — higher educated mothers and their daughters. Of the 36 correlations, 15 were significant in this subgroup, while none were significant in any of the other subgroups.

The correlations between the six child and six parent scales among higher educated mothers and daughters are shown in Table 2. It is interesting that the significant correlations occurred most consistently among a subset of variables measuring mothers' recollections about their high school math rather than among mothers' current attitudes toward math. All three measures of mothers' past attitudes were significantly ($p<.05$) correlated with all six of the daughters' attitudes.

The fact that significant relationships were found only among these mothers and daughters and then primarily for these variables suggests two possibilities. First, mothers' past math attitudes may be more salient than present attitudes when it comes to understanding their daughters' math work. Mothers' memories of their own high school math experiences may be evoked when they observe their daughters doing math work or interact with their daughters in this context. Also, these mothers' current daily work routines may not involve math, making it less relevant in these situations. This may lead mothers to show sympathy, if they remember struggling with math, or support, if they remember doing well in math. Situations in which daughters

are having difficulty with math may particularly elicit these reactions. Additionally, since mothers believe sons to have higher ability than daughters and math to be more important for sons than daughters (Jayaratne, 1983), mothers may show less sympathy toward their sons' math work than their daughters'.

Second, the occurrence of these modeling effects among better educated mothers, but not fathers, and among daughters but not sons, may be due to the stereotype of math. Because this stereotype is in the male domain, fathers may be more hesitant than mothers about letting their children know either of their past struggles with math in high school or of their present doubts about their math abilities. Furthermore, parents may be be less likely to want their sons to know about their own negative math attitudes than their daughters. This suggests the possibility that daughters of higher educated mothers share their mothers' attitudes, in part, because they are more aware of those attitudes than other children.

In order to test for this possibility we correlated children's perceptions of their parents' liking of math with parents' present enjoyment of math separately for each of the subgroups. The results, shown in Table 3, indicate that although daughters of higher educated mothers were slightly more accurate in assessing their mothers' attitudes to math than most other children, they were no more accurate than sons of higher educated fathers in assessing their fathers' attitudes. Furthermore, children were no more accurate in estimating their mothers' math attitudes than their fathers' attitudes. With one exception, all children were moderately accurate in their assessments of their parents' attitudes. The only group whose parental perceptions were inaccurate were sons of lower educated mothers. These findings suggest that modeling effects are not necessarily due to accuracy in children's perpections of their parents' math attitudes. Furthermore, they do not necessarily support the above propositions that mothers are more revealing than fathers and that parents are more revealing to daughters than sons about their negative math attitudes. It does suggest, however, that greater accuracy may be slightly more likely among children of higher educated/same-sex parents.

A final analysis was conducted in order to rule out the possibility that modeling effects were actually due to the indirect effect of higher educated mothers' own attitudes on their expectations for their daughters' math achievement. This was a concern since there was a strong relationship between parents' expectations and child outcomes (Parsons, et.al., 1982). We conducted path analyses with higher educated mothers' own attitudes to math predicting to daughters' attitudes mediated by mothers' expectations. Figures 1-4 show that these mothers' own attitudes to math had a significant direct effect on their daughters' attitudes, even after their expectations were taken into account.

These results suggest that highly educated mothers not only function as expectancy socializers of their daughters' math attitudes, but also as role models. Furthermore, these modeling effects may, in part, originate in mothers' past attitudes toward math. Such findings imply that these mothers' recollections of their attitudes toward math in high school are particularly potent and may ultimately impact on their daughters' math attitudes. This information, along with our previous findings concerning the strong effects of parental expectancies on children's math attitudes, can inform parents' intervention strategies for increasing positive attitudes toward math among girls.

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1. Although we realize that we cannot assume any causal effects from this correlational analysis, it is much more likely that parents' own attitudes toward math will affect their children's attitudes, rather than the reverse effect.

2. Note that for the effort and difficulty scales, a positve relationship with the other attitudes would be indicated by a negative correlation.

3. We used this higher criterion for significance since our sample size was large and we were generating a large number of correlations.

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TABLE 1

NUMBER OF SIGNIFICANT CORRELATIONS BETWEEN SIX PARENT AND SIX CHILD ATTITUDES TO MATH SCALES

($P \leq .01$ & CORR > 3)

	MOTHERS		FATHERS	
	DAUG	SONS	DAUG	SONS
PARENTS' EDUCATION LEVEL				
LOWER ED (SOME COLLEGE OR LESS)	0	0	0	0
HIGHER ED (COLL DEGREE OR HIGHER)	15	0	0	0

TABLE 3

CORRELATIONS BETWEEN CHILDRENS' PERCEPTIONS OF THEIR PARENTS' LIKING OF MATH AND THEIR PARENTS' ENJOYMENT OF MATH

	mothers		fathers	
	low ed	hi ed	low ed	hi ed
daughters	.32***	.44***	.33***	.37***
sons	.10	.35**	.35***	.45***

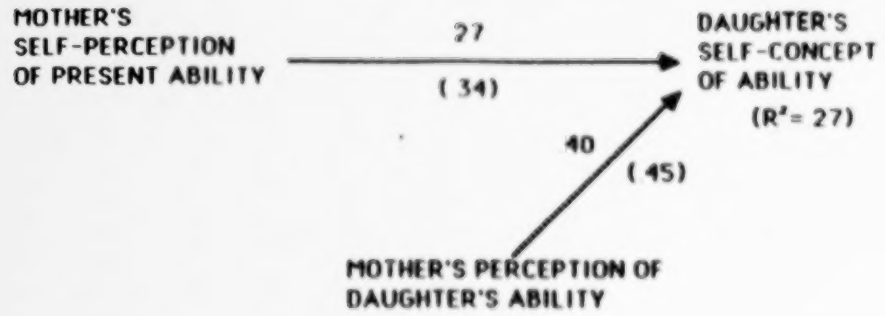
**p≤.01 ***p≤.001

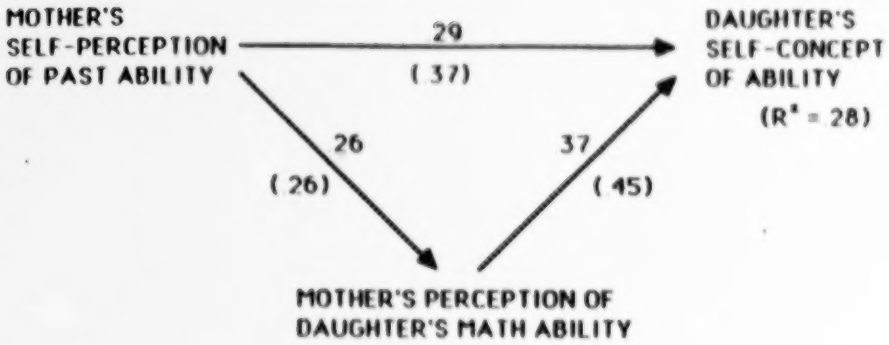
TABLE 2

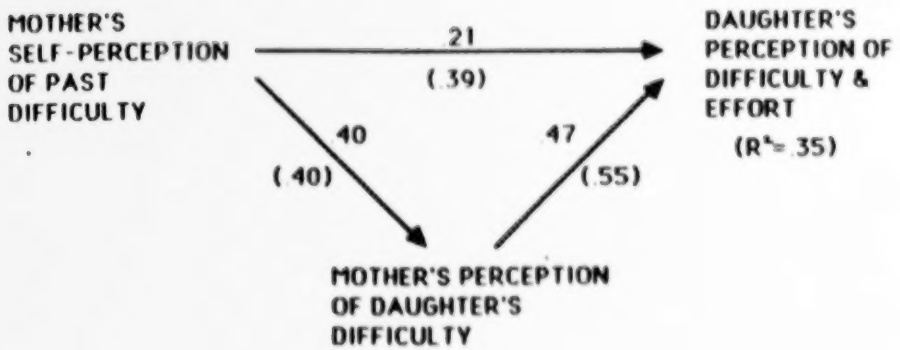
CORRELATIONS BETWEEN MATH ATTITIUDES OF HIGHLY EDUCATED MOTHERS AND THEIR DAUGHTERS

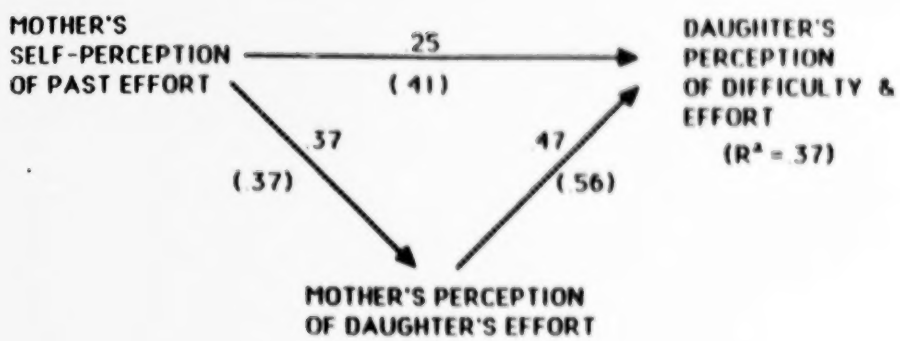
	DAUGHTERS' ATTITUDES					
MOTHERS' ATTITUDES	self concept of ability	current expect	future expect	difficulty & effort	value	take more math
present ability	.34**	.27*	.29*	-.35**	.18	.14
past ability	.37***	.33**	.30**	-.34**	.27*	.27*
present enjoyment	.17	.09	.14	-.26*	.14	.10
present difficulty	-.08	-.05	-.07	.22	-.11	-.02
past difficulty	-.36***	-.32**	-.28*	.39***	-.36**	-.30**
past effort	-.36***	-.34**	-.29*	.41***	-.31**	-.27*

*p≤.05 **p≤.01 ***p≤.001


MOTHER'S SELF-PERCEPTION OF PRESENT ABILITY
.27
(.34)
DAUGHTER'S SELF-CONCEPT OF ABILITY
(R^2 = .27)
.40
(.45)
MOTHER'S PERCEPTION OF DAUGHTER'S ABILITY


MOTHER'S SELF-PERCEPTION OF PAST ABILITY
.29
(.37)
DAUGHTER'S SELF-CONCEPT OF ABILITY
(R^2 = .28)
.26
(.26)
.37
(.45)
MOTHER'S PERCEPTION OF DAUGHTER'S MATH ABILITY


MOTHER'S SELF-PERCEPTION OF PAST DIFFICULTY
.21
(.39)
DAUGHTER'S PERCEPTION OF DIFFICULTY & EFFORT
(R^2 = .35)
.40
(.40)
.47
(.55)
MOTHER'S PERCEPTION OF DAUGHTER'S DIFFICULTY


MOTHER'S SELF-PERCEPTION OF PAST EFFORT
.25
(.41)
DAUGHTER'S PERCEPTION OF DIFFICULTY & EFFORT
(R^2 = .37)
.37
(.37)
.47
(.56)
MOTHER'S PERCEPTION OF DAUGHTER'S EFFORT

FIGURES 1-4